Sustainable renovation strategy in the Swedish Million Homes Programme: A case study

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Abstract

The first part of the study concerns the concept "sustainable renovation". Four parts are identified and then used in the case study: environmental sustainability (including energy efficiency and choice of materials); social sustainability (interpreted as that the current tenants should be able to stay in the area), economic sustainability (the the project does not have to be subsidized and that there is no increase in cost for the social authorities) and finally a new interpretation that is called technical sustainability, which means that solutions with long term reliability is chosen even if this is not necessarily best from an economic and environmental perspective.

The second part of the study applies this framework to analyze the renovation strategy of a municipal housing company in the suburbs of Stockholm. This case was chosen because they had clear social ambitions and offered the tenants three alternative renovation options called mini, midi and maxi. Most tenants chose the mini-alternative and this meant that they could afford to stay and that there was not any increase in the cost for the social authorities. An investment analysis showed that the mini-alternative had a positive net present value, but that the midi/maxi alternative where more profitable. The company had no specific environmental focus and energy use was only reduced with 8%. Technological sustainability was more important for the company.

As a conclusion the study shows that a sustainable renovation is possible but that there are a number of conflicts between the different dimensions of sustainability. Giving more weight to environmental sustainability would increase cost and rents which create problems from a social perspective. From an economic perspective the midi/maxi alternatives were more profitable but then some households would have to move out because too high rents.

Keywords: housing renovation, sustainable renovation, million-homes programme, Sweden

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1. Introduction

1.1 Background

During the period 1963-1973 one million new homes were built in Sweden. The aim was to replace housing without modern amenities and to get rid of the housing shortage that had grown when the pace of urbanization increased (Hall & Widén, 2005). The Million Homes Program is described a little more in detail in Högberg, Lind & Grange (2009). The municipal housing companies played a large role during the Million Homes Program even though the program also included private rental housing, tenant-owned cooperative housing and privately owned single—family homes. In this paper the focus is however on the strategy of one municipal housing company located in the periphery of the Stockholm Metropolitan area. In order to avoid conflicts with EU-legislation about state subsidies and competition a new law in Sweden (Law 2010:879) came into effect January 1st 2011. The law states that the Municipal Housing Companies shall act in a business-like way. Knowledge about how Municipal Housing Companies interpret the new law and how they form their business strategies related to renovation is lacking (see Elzinga & Lind 2012) and one aim of this article is also to discuss the interpretation of the law in the context of renovation projects with a social focus.

The technical quality of the houses built during the Million Homes Program is very diverse. Some buildings have already been demolished and some have been renovated (see Högberg 2011), but it is in recent years that the issue of renovation of especially the multi-family housing stock has come to the center of the political debate (see SABO 2009). The basic technical quality of the houses is of often good (Stenberg 2013) and the question is typically not whether the houses should be demolished or not, but rather how they should be renovated and to what extent. The exception to this is only in areas with falling population and excess supply of housing, but this currently only concerns a small share of the municipalities (see BKN 2011).

The concept of sustainability has been in the center of the public debate since the Brundtland report was published in 1987. Later sustainability has been divided into three dimensions – environmental, social and economic. Several authors have discussed general tools and models that can be used to evaluate renovation policies from a sustainability perspective (Thuvander et al 2012, Gohardani & Björk 2012, Mickaityte et al 2008) and these will be returned to below. The concept of “renoviction” where cost increases due to extensive renovation will disable poorer households to move back to the renovated apartment (Westin 2011), points to possible conflicts between the need to improve the housing stock and the need to improve the housing situation of low-income households.

We consider the Municipal Housing Companies and their renovation strategies to be an important issue to study from the duality of the new legislation about acting in a business like way and the demands from a sustainability perspectives: environmental, social and economic. As the Million Homes Programme is such a large part of the housing stock in Sweden the renovation strategies will have a large influence on the Swedish housing market for many years to come.
1.2 Purpose

The main purpose of the study is to analyze and extract what lessons can be learned about sustainable renovation from a company that tries to live up to all aspects of the sustainability concept. The hypothesis is that studying in depth one company representing “the best practice” could help to clarify problems and possibilities. The aim is also to critically evaluate measures and strategies of the studied company and discuss possible alternatives.

The study is part of a broader study were also renovation strategies in the private rental stock and in the cooperative housing sector are analyzed and evaluated.

1.3 Structure of the paper

In section 2 there is an attempt to make the different dimensions of sustainability concept more operational in the context of renovation of multi-family rental housing estates. Section 3 explains and motives the method used and in section 4 the results from the case study is presented. In section 5 the results are analyzed. Conclusions and recommendations can be found in section 6.

2. The concept of sustainability in a renovation context

2.1 Environmental sustanability

The environmental classification systems like LEED and BREEAM can here be the starting point, but as the location and general structure of the buildings are given in the context of renovation, the most relevant dimensions are:

- Energy use: The renovation of the Million Homes Programme has been seen as a “window of opportunity” for radical reductions in the energy use in the buildings (see Högberg, Lind & Grange 2009). The share of energy from renewable energy might also be increased as result of the renovation.

- Choice of materials. In Sweden there are several systems for classifying construction materials and components from an environmental perspective (e.g. Sunda hus, BASTA, Svanen/EU Ecolabel) where one aspects is the absence of chemicals/hazardous materials.

- Waste management, water management: When renovations are made there might also be opportunities to improve features of the building that are relevant for other environmental dimensions and here we think of e.g. waste management and bicycle rooms and improvement of green areas, e.g. in order to improve water management.(ref?)

-Environmental classification systems also include the indoor environment. Environmental consideration must take into account the residents’ health and well-being. How the tenants experience their dwelling, e.g. lighting, noise, temperature, ventilation, etc., is an aspect that is important to look at. One aspect of this is also moisture control. The Swedish system
“Miljöbyggnad” has e.g. one category related to promoting buildings without damage by moisture and developing moisture secure constructions.

**Innovation.** The classification systems encourage trying new environmentally friendly solutions, and this will also be included in this study.

**Management.** Some of the classification systems also assess how the buildings are managed, i.e. how they are run after some time in operation. Investigating the systems used to make sure that the buildings are operated in a correct way is therefore also important. Even if this issue is most problematic in cooperative housing (see Kenne 2013), it will be studied in this case also.

### 2.2 Social sustainability

The concept of social sustainability also has a number of dimensions and there are at least two that are relevant in the renovation context (see e.g. Botta 2005, Weingaertner & Moberg 2011 for a general discussion about social sustainability):

**The preservation of social capital and the local community.** More specifically a renovation contributes to social sustainability if it is carried out in such a way that households are not forced to move to other areas. There have been several critical reports in Sweden (e.g. Westin 2011) that argue that renovations have been more or less consciously designed in such a way that low income and/or socially weaker households have been forced to move out and have been replaced with economically stronger households. The renovation then tends to contribute to segregation and most probably a loss of social trust among the households that were forced to move out. Social trust is based on certain norms and values: economic equality among others (Rothstein 2011). If municipal housing companies use “renoviction” as a business strategy, it is a risk that the social trust in society will decrease. As an effect, criminality could rise since social capital in forms of prosocial norms in buildings is found to have a lowering effect on crime (see Saegert and Winkel 1998). The strategy might be profitable for the landlords in the short run but can be counterproductive for the society in the long run (Valenti and Giovanni 2013).

Renovation might be designed in such a way that it increases social capital by reducing crime and poverty among the present population, e.g. by educating and employing the residents of the area in the renovation projects, and by increasing the availability of service and job opportunities – creating a safer and more prosperous environment for those who live there now (Nilsson and Lundmark 2012).

**Another aspect of social sustainability is that the ambition should be to create mixed communities with a low level of segregation between different income and ethnic groups.** In an area where gentrification is going on it might be motivated from the perspective of social sustainability to try to slow this process down and make it possible for poorer groups to stay in the area (longer). In areas that currently is dominated by low-income households it might instead be motivated with measures that make the area more attractive to other social groups in order to reduce segregation.

This second dimension of sustainability is however problematic for two reasons. Firstly, the strategy to create mixed communities as a solution to problems which we here might embody
in the concept of ‘social exclusion’ is popular among policy makers but renders weak theoretic and empirical support among scholars (Galster 2007, Andersson 2006). Secondly, the strategy come into conflict with the first dimension when the focus is on areas like the one studied in this article – less attractive suburban areas rather far from the city-center in metropolitan regions. Here there is no gentrification going on and the areas are dominated by low-income households. If parts of the apartments were renovated to high standard this might lead to households with a better economic situation moving in and thereby contribute to creating a more mixed community. “Forcing” some poorer households to move out would then reduce economic segregation. Changes in the social structure might also be accomplished by adding row-top apartments or new houses with higher qualities (Boverket 2010).

In this article the choice has been to focus primarily on the first dimension of social sustainability. A renovation project then contributes to social sustainability if it is carried out in such a way that no household is forced to move because they cannot afford to pay the higher rent after renovation. We think this dimension is the most important one in the current Swedish context where there are few alternatives for poorer households that are forced to move out of a suburban Million Homes area (see Lind 2014 for a more general discussion of the tenants’ situation from a human rights perspective).

2.3 Economic sustainability

From the perspective of a housing company a renovation project can be called economically sustainable if it gives an acceptable rate of return on invested capital. The current legislation concerning municipal housing companies in Sweden actually says that the company must act in a “business like way” and this can be interpreted as that the company is only allowed to make an investment if it gives such a return (see Lind & Elzinga 2012, Bröchner et al 2013). Some minor “unprofitable” investments can be motivated from the perspective of Corporate Social Responsibility that also private companies carries out, but this can hardly be relevant for the kind of large scale renovation measures studied in this paper. Another way to put this is that if a renovation project is economically sustainable it should not be necessary to finance it by internal or external subsidies.

Another aspect of economic sustainability concerns the effect of the renovation project on social costs paid by the public sector. The economic support system for low income household in Sweden includes payments that are related to the households housing costs. If the rent level goes up when an area is renovated, part of this increase may in reality be paid by economic support from the central government or from the municipality. This kind of process when renovations lead to higher social expenditure for the municipality, and more and more households become dependent on the welfare system can hardly be seen as a situation that is economically sustainable in the long term.

2.4 Technical sustainability - a fourth aspect

The three dimensions of sustainability discussed above are mostly seen as “the” concepts of sustainability. The discussions with especially the technical staff of the company raised the questions whether there might be a fourth interesting interpretation of sustainability in the context of renovation.
In a specific situation there might be a number of technical alternatives for solving a certain problem. Some of these techniques might be older and better tested and some will be newer and more risky. Some alternatives may solve the problem for a long time and some may only solve it for a shorter time span. Choosing a more long term and well tested solution can be described as choosing a more “technically sustainable” solution. This idea also seemed to be related to taking measures before there was a real risk of breakdown and acting in a pro-active way, i.e. working with preventive maintenance.

This concept of technical sustainability cannot be reduced to neither environmental nor economic sustainability. The more long term solution might use more material and thereby, at least in some cases, affect the environment more than if a series of short term solutions are chosen. If the investor demands a rather high rate of return it might be better from an economic perspective to use the short term solutions, and also rational to wait a little longer before taking any measures. The more uncertain the long term situation is, the more rational could waiting and/or choosing the short term solution be, both from an economic perspective and also from an environmental perspective.

3. Method

The choices made concerning research method were taken in three steps.

The first step was the decision to carry out a case-study. The general advantages and disadvantages of case studies are well known, and the motive for making a case-study was that a deeper understanding was needed about how a municipal housing company could argue concerning the choice of a specific renovation strategy, especially the interaction between environmental, social and economic sustainability. Studying one case in detail would generate knowledge that are useful when in a later stage of the project more general studies of various aspects of the renovation process are planned to be made. The study is from this perspective an explorative study and a starting point for further studies.

The second step was the choice of company. As described in e.g. Högberg et al (2009) it is well known that companies follow different strategies when renovating their Million Homes Programme buildings. In the Swedish debate the company studied here has been very active and presenting their way of carrying out the renovation as a more socially sustainable way. The company presents an image as being a ”customer-oriented company” which among other things includes an ambition to renovate in such a way that no household is forced to move because of economic reasons. By studying closer how they actually worked with this and to what extent they live up to their ambitions important knowledge could be generated about how a sustainable renovation could be carried out - and also how the strategy is related to goals about environmental and economic sustainability.

In the third step an interview study was designed and persons with the positions described in table 1 have been interviewed on one or several times in order to get a clear and consistent picture of what has been done, the reasons behind this and the actors´ evaluation of the consequences.
Table 1 Interviewed persons

In the company
CEO
Members of the board of the company (political representatives elected by the municipality).
Head of Property Management
Head of Property Marketing Director and head of Customer Service
Staff member responsible for Leasing and Tenancy Agreements
Staff member responsible for Social Lease Contracts

Outside the company
Representative of the Tenant’s Union in the area
Public official responsible for the Social Lease Contracts of the Municipality

The interviews were open ended with a checklist of questions as a starting point. The most common situation was that two researchers carried out the interviews together which reduced the risk of misinterpretation and made it easier to ask follow-up questions and document the answers. Contacts were taken afterwards with several of the interviewed persons in order to clarify certain points.

4. Empirical results

4.1 General background to the current design of the renovation programme

In order to understand the current renovation policy of the company it is important to understand earlier projects and decisions related to that.

In the first area that the company renovated (area A) the idea was to renovate whole buildings to a standard that was on roughly the same level as newly constructed houses. For a typical 3-room apartment the renovation cost this meant a cost of almost 1 million SEK per apartment. The project turned out to be much more costly than expected and there were protests from the tenants. Given the suburban location of the areas and the relatively low attractiveness, high increases in the rent level were difficult to carry out also from a market perspective.

When a new CEO was hired this renovation policy was stopped and there were two explanations for this. The first was financial feasibility. Even if it would be possible to increase the rent in a way that made the renovation profitable, the company judged that it would not be possible to raise enough capital to carry out his type of renovation in the whole of the company’s housing stock that were built during the Million Homes Programme. Roughly 3000 of the company’s 5000 apartments were built during that period.

One complicating factor that should be mentioned is the balance sheet effects of such a renovation policy. As the property values for rental housing in suburban areas are rather low, it might be the case that the market value of the properties after the renovation are lower than the sum of the original book value and the renovation cost. The difference would then have to be booked as a cost and then the company would have to report large losses and this was not
judged to be possible (see Nordlund 2012 for a discussion of these problems). The same situation with high reported losses can occur if measures that are classified as maintenance must be reported as cost in the year when they are carried out. In the Swedish regulations, maintenance is defined as measures that restore the original quality of the building, and a number of things carried out during a renovation project could be classified as maintenance. The effect of reporting this as cost would then be high reported losses for the company if they carry out costly renovations. These accounting rules are now changed and all long term measures should now be booked as investment. The first effect – that market values may not be high enough after renovation – is however still a potential problem for companies carrying out large scale renovations in areas with low market values.

The second reason for stopping the initial renovation policy was the social dimensions. The political majority and the new CEO believed that it was socially unacceptable and perhaps also economically risky to renovate in such a way that a considerable number of the current tenants could not afford the new rent. This would either lead to households moving out or to increasing costs for the social authorities. Higher tenant turnover and having many apartments with rather high rents in an area that is not among the most attractive could also be seen as risky from a strict economic perspective. Currently the housing shortage is high in the Stockholm region so it might be possible in the short run to find tenants willing to pay the high rent, but this might not be the case in a longer perspective.

Even if the goals of the renovation was changed and the focus was more on current tenants and their needs and economic situation, the renovation still demanded a large amount of capital. In order to raise capital the company therefore decided to sell part of the housing stock built during the Million Homes Programme (approximately 600 apartments). Given the social ambitions and political goals of the municipality such a sale could be expected to be controversial unless the right buyer could be found and here it turned out that the timing was very good. After the financial crisis in 2008 several of the Swedish public pensions funds started to see the real estate market as a more interesting alternative and a number of new real estate companies were started (see Larsson 2013). These new companies had different focus but the housing market was of interest for several of the companies and they were also seen as more long term and less speculative than ordinary private companies. The Social Democratic majority in the municipality saw it as more legitimate to sell to a company owned by a government pension fund than to "ordinary" private companies. One of these pension fund controlled companies also had a leading former Social Democratic politician in their top management team and this could also have contributed to make a sale more politically acceptable.

4.2 Basic description of the current renovation strategy

The company describes the renovation strategy that has been implemented in recent years as related to the following three aspects.

- Technical aspects: What do we have to do in order to keep the buildings in good technical conditions? What can and what do we want to do more than this?
- Customer aspects: What do the tenants want to have?
- Economic aspects: What are the economic consequences for the company of different alternatives? What are the economic consequences for the households?
It was decided that each household could choose between three alternatives for the renovation of their apartment. The information below is taken from a presentation by the CEO of the company and from the interviews.

In the Mini-alternative the plumbing is replaced, the bathroom is renovated, and ventilation and electricity systems are replaced. The name for this alternative can be questioned as these are rather large measures, but the focus in the Mini-alternative is on what the company sees as technically necessary for the long run use of the building.

In the Midi-alternative the kitchen is also renovated (except the cabinet frames).

In the Maxi-alternative the addition is that all interior surfaces (painting, wallpaper, floors) are renovated, so the Maxi-alternative is almost the same as a totally renovated apartment that are much like a newly built apartment.

The average costs for these renovation in the first housing estate, and the allowed rent increases, are presented in Table 2 below. The total investment below includes what the company classifies as maintenance measures (270 000 SEK per apartment). The distinction between investment and maintenance is important as the Swedish rent regulation system allows rent increases when the standard of the apartment is improved, but not for maintenance measures as they as seen as included in the standard rent.

Table 2 Economic consequences of the three renovation alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Total cost per apartment</th>
<th>Negotiated rent increase per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini</td>
<td>490 000 SEK (8000 SEK/SQM)</td>
<td>820 SEK</td>
</tr>
<tr>
<td>Midi</td>
<td>510 000 SEK (8400 SEK/SQM)</td>
<td>1790 SEK</td>
</tr>
<tr>
<td>Maxi</td>
<td>685 000 SEK (11200 SEK/SQM)</td>
<td>1900 SEK</td>
</tr>
</tbody>
</table>

In the following sections the renovation will be described in more detail from the different sustainability dimensions. It should already here be underlined that the company has a clear pro-active perspective, trying to solve not only current problems with e.g. water damages but also be one step ahead and take measures before more problems arise. One aspect of this was that the company improved their information system and systematically started to check the technical systems with predetermined intervals.

4.3 Environmental sustainability

Högberg et al (2009) describes three “ideal types” when it concerns the housing companies environmental focus in the context of renovations. The three ideal types are “The Strict Profit Maximizing Company” that only carries out measures with a pay-back period of 3-5 years, “The Little Extra Company” that carries out some extra measures even if they are not strictly profitable and “The Ambitious Company that is willing to carry out large scale investments to reach very highly set environmental goals, e.g. passive house status when it comes to energy
use. The company studied here fall in the second category, but the “little extra” that it does is mainly related to customer satisfaction and not the environmental goals as such. The company has not aimed at any environmental classifications of the buildings after renovation even if it might have been possible to get a EU Green Building classification as there is considerable reduction in energy use. The same energy system is however used – district heating – and there are not investments in e.g. solar panels or in wind power.

The rents in Sweden usually include heating and this means that all reductions in heating costs or in the use of electricity in common areas directly reduces the operating costs of the company. The electrical appliances within the apartment are however paid by the tenants.

A number of measures were planned in order to reduce energy consumption. Different alternatives were analyzed, partly with the help of external consultants, before choices were made. Here are some examples:

- FTX- ventilation system. This was also motivated by increased comfort for the tenants as draft would be reduced. From a strict economic perspective it was not judged to be profitable. If a house has a natural draught ventilation system the energy losses are considered to be rather low in the first place, The energy savings by installing a FTX system will then be rather low. The houses are linked to a district heating system as is common in Swedish multi-family housing. The hydronic heating system was changed from a one-pipe system to a more reliable two-pipe system which is an advantage both for the tenants’ comfort and from a property management perspective.

- Improvements in the shell of the building. Insulations in the loft is increased to 25 cm as a thinner insulation leads to a situation where the attic floor becomes a strong thermal bridge which both means high energy consumption and problems with comfort for the tenants.

- Another measure was to put perlators in the shower fittings and thereby reduces the consumption of hot water. This was primarily done in buildings having problems with the supply of hot water and so two problems were solved at the same time.

- Low energy lightings were installed in stairwells.

- Improvements in order to increase efficiency were also possible in exhaust air heat pumps that are used in some buildings.

- In order to optimize the heating as system where it is automatically adjusted to weather forecasts (forecast control) was introduced. This alone would save the company more than 1 million SEK per year.

- Replacement of the heat exchangers in the district heating system is carried out together with the district heating company. This both increases reliability and reduces cost related to thermal losses.

FTX, forecast control, and replacement of heat exchangers are measures that have been performed in the renovated houses leading to 8 % less energy consumed.
There have also been a number of more strategically motivated measures. Price increases for district heating in recent years have created incentives for property owners to look for other sources of heating. The company is actively investigating such alternatives and working with improving their current use of other sources, e.g.

- Upgrading the exhaust air heat pumps (see also above).

- Recovery of heat from the wastewater. Systems for this are tested in some buildings on an experimental basis.

- The company also investigates the possibility to use geo-thermal heating linked to solar panels and also use excess heat from a nearby supermarket. More than 7000 meters of drilling holes would then be used.

The company has introduced individual measurement of hot water in 1200 apartments but it has been some technical problems with this.

4.3 Social sustainability

Social sustainability was important for the company and the first aspect of this was the design of the process for carrying out the renovations. The Mini, Midi and Maxi-alternatives reflected the failures of the renovation in the first area and the alternatives and the rent increases were negotiated with and approved by the Tenants’ Unions.

Staff from the company contacted each household in order to find out about the current housing situation, e.g. specific problems with draught, and the households preference concerning their future housing situation. The household could choose if they wanted staff to visit them or if they wanted to have the meeting at the company or somewhere else. It should be underlined that the company did not want people to move to apartments in the stock that should be renovated in the future. They thought that ”everyone” should get an improvement in their housing situation and were probably afraid that there was a risk that this would create an unwanted social structure in these areas. The tenants signed a document where they agreed to the renovation.

Before the major renovation one apartment in each block was renovated to each of the different standard levels and was exhibited to the tenants to give them a clearer idea about what was planned.

There were also meetings in each block where more general features of the buildings, e.g. concerning the entrances and the green areas surrounding the houses.

In order to make the renovation process as smooth as possible temporary housing was put up near the houses that was to be renovated, as households had to be evacuated during the period when the work was carried out. They could however leave furniture and things not needed during the 8 weeks that they were evacuated. This has worked very well and the Tenant’s Union has not heard any complaints from the tenants during the process.
On average 10% of the tenants move out when the renovation was carried out, but this is around the same figure as the normal turnover in the area. Of the remaining tenants, 85% choose the Mini-alternative, 10% the Midi-alternative and 5% the Maxi-alternative.

If there had been an increase in lease contracts paid by the social authorities, so called social lease contracts, we could assume that those households would have reached a point where they could no longer afford to pay the rent. The new rent after renovation would then be too costly for the some households. The social authorities have collected data on social contracts since the year 2010 and they report that they observe no increase in social lease contracts related to the company’s renovation projects.

To illustrate the effect of the rent increases due to renovation alternative Mini, we made some simple calculations with data on rent allowances available at the webpage of The Swedish Social Insurance Agency, see table 2 below.

Table 2 Net effect of the rent increase at different income levels (alternative Mini) for a single parent household with two children and a typical apartment of 3 rooms and kitchen, 70 sqm.

<table>
<thead>
<tr>
<th>Income before tax (SEK)</th>
<th>Before renovation Rent 5000 (SEK/month)</th>
<th>After renovation Rent 6000 (SEK/month)</th>
<th>Net Rent increase (SEK/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Allowance Net rent</td>
<td>Allowance Net rent</td>
<td>Tenant</td>
</tr>
<tr>
<td>190 000</td>
<td>2500 2500</td>
<td>3000 3000</td>
<td>500</td>
</tr>
<tr>
<td>200 000</td>
<td>2400 2600</td>
<td>2800 3200</td>
<td>600</td>
</tr>
<tr>
<td>225 000</td>
<td>2000 3000</td>
<td>2400 3600</td>
<td>600</td>
</tr>
</tbody>
</table>

Source: Figures on rents and income interpreted from PPT-pictures of the company, Nov 1st 2012.

The results of the table tells us that this tenant pay 50-60% of the rent increase due to the renovation alternative Mini. The corresponding income raise to this net rent increase would be approximately 800 SEK/month and 9 600 SEK/year taken into account the tax rate of the municipality. That sum is equivalent to quite a high income increase of 5%.

In a long term perspective it is important to see how the rent increase affects who will be able to rent an apartment. One aspect in then the income demands that the company have on new tenants, which is that the income before tax should be at least three times the rent. With the current rent (5000 SEK/month) the income demand is 15 000 SEK/month or 180 000 SEK per year. After the renovation the rent will be 6000 SEK/month and the income demanded would be 216 000 SEK per year, which is equal to the average income of the current tenants in the company. In the long term this means that when an apartment becomes vacant the current tenant will be replaced with tenants that on average have higher income than the tenants moving out.
4.4 Economical sustainability

*From a company perspective*

Economic calculations always mean a comparison between two alternatives. Often the alternative is implicit and reflected in the rate of return demanded. There is an unspecified option that would give a% in return and the question is whether the current investment opportunity gives more than a%.

But when evaluating a specific renovation project it is important to clarify the alternative to renovating in the way the company has done – or more exactly – what would be the best alternative to the current renovation strategy? There are a lot of alternative options, e.g. renovating to a higher standard for all buildings as they did in the first area or demolishing and building new houses or waiting with the renovation some more years. Given the company’s goal of being a service company with a customer focus they have already discarded the first alternative and the second alternative should be worse than the first, as the costs and the rents would be even higher if new houses were built. The third alternative – wait some years – then seems to be the best alternative. Choosing this as the main alternative can also be motivated by the results in Muyingo (2010) that indicate that private owners of Million Homes Programme houses tend to wait with renovation longer than municipal housing companies.

The calculations below consist of a comparison between the policy actually followed by the company and an alternative that consist in waiting for 10 years with the renovation. A large number of assumptions have to be made and below is a list of these. Motivating the specific assumptions are difficult, but a sensitivity analysis is made to illustrate how sensitive the results are to the assumptions.

**Basic assumptions:**

- The calculations are made in *real terms* – unless otherwise stated it is the assumed that everything adjusts to inflation (interest rates, rents, costs) so relative prices are not affected by inflation.

- The calculations focus on the *difference* between the two alternatives: Renovating now or waiting 10 years. The basic calculations are made for one apartment with the Mini-alternative, and then the Midi and Maxi alternatives are evaluated separately through a new difference-analysis.

- The calculation covers a *10-year period*. It is assumed that the renovated and the run-down building fall in value with the same absolute amount every year. The difference in value in year 10 is then equal to the investment made in year 1 in the renovated apartment. It could be argued that this implies that the house that is renovated now will have the same value as a newly renovated house in year 10, but that there should be a difference in value between these houses in year 10. The assumption can however be reasonable if renovation costs increase in real terms over time because of relatively low productivity development in the construction sector. If renovation costs increase in real terms then the book value of the house that is renovated in year 10 will be higher than the book value for the houses the were renovated 10 years ago.
- The real discount rate is assumed to be 3%. Real interest rates have been falling in recent years and a long term value could be between 1-2%, and the adding risk compensation could then motivate a 3% real discount rate. This rate is actually higher than the real rate paid by the company for loans during the last years. To simplify calculations it is assumed that both rents and all operating costs are paid at the end of the year.

- The rents are assumed to be constant in real terms over the 10-year period, both the rents in the renovated and the rents in the non-renovated apartments.

- Operating costs for the non-renovated case are assumed to include cost for water damages and other repairs on the same level as in recent years. According to figures from the company these costs were approximately 20 million SEK in 2012 and it is assumes that all of these are in the 3000 Million Homes Programme apartments the cost per year per apartment would be around 6500 SEK. Further assuming that energy use is reduced with 20 kWh per sqm and year then for an average apartment of 70 sqm the reduction in energy cost would be 1500 SEK per apartment (energy price 1SEK/kWh.) Other operational expenses are estimated to be 1500 SEK per apartment per year. The total reduction in operating costs would then be 9500 SEK per year. It is further assumed that the difference in operating costs will be the same for mini, midi and maxi-alternative.

The results from the basic calculations for the Mini-alternative are presented in Table 3 below.

Table 3 Profitability of the Mini alternative for a typical apartment (SEK)

<table>
<thead>
<tr>
<th>Renovation cost per apartment</th>
<th>490 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent increase per apartment per year</td>
<td>10 000</td>
</tr>
<tr>
<td>Present value of rent increases</td>
<td>85 000</td>
</tr>
<tr>
<td>Reduction in operating cost by renovation, per apartment</td>
<td>9 500</td>
</tr>
<tr>
<td>Present value of reduction in operating costs</td>
<td>81 000</td>
</tr>
<tr>
<td>Difference in value at the end of year 10</td>
<td>490 000</td>
</tr>
<tr>
<td>Present value of difference in exit value</td>
<td>365 000</td>
</tr>
<tr>
<td>Total present value of project</td>
<td>+ 41 000 (531 000 – 490 000)</td>
</tr>
</tbody>
</table>

As we can see, the Mini-alternative is profitable for the company given the assumptions made. In Table 4 below a small sensitivity analysis is made, by first increasing the interest rate to 4% and then reducing the reduction in operating costs with 30% as the year that the data came from might be exceptional. As we see the Mini-alternative is still profitable even in the reduction of operating cost is somewhat lower. At an interest rate of 4% the project shows a very small loss, but given the uncertainty in the assumptions one could say that at 4% real interest rate the project approximately breaks even.
Table 4 Sensitivity analysis for the “Mini-case” for a typical apartment, SEK

<table>
<thead>
<tr>
<th></th>
<th>Present value of project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate 4%</td>
<td>- 1000</td>
</tr>
<tr>
<td>Reduction in operating costs to 7000 SEK</td>
<td>+ 17 000</td>
</tr>
</tbody>
</table>

In Table 5 and 6 below the profitability for the Midi and Maxi-alternatives are presented. The calculations for the Midi-alternative start from the Mini-alternative and look at the changes in costs and revenues of going from Mini to the Midi level of renovation. In the same way the Maxi-alternative is compared with the Midi-alternative.

Table 5

a) Profitability of going from “Mini” to “Midi” for a typical apartment

<table>
<thead>
<tr>
<th>Extra renovation cost</th>
<th>20 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra rent increase per apartment per year</td>
<td>11 600</td>
</tr>
<tr>
<td>Present value of rent increases</td>
<td>98 500</td>
</tr>
<tr>
<td>Difference in value at the end of year 10</td>
<td>20 000</td>
</tr>
<tr>
<td>Present value of difference in exit value</td>
<td>14900</td>
</tr>
<tr>
<td>Increase in present value of project</td>
<td>+ 93 000</td>
</tr>
</tbody>
</table>

b) Calculations for going from “Midi” to “Maxi” for a typical apartment

<table>
<thead>
<tr>
<th>Extra renovation cost</th>
<th>175 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra rent increase per apartment per year</td>
<td>1 300</td>
</tr>
<tr>
<td>Present value of rent increases</td>
<td>11 100</td>
</tr>
<tr>
<td>Difference in value at the end of year 10</td>
<td>175 000</td>
</tr>
<tr>
<td>Present value of difference in exit value</td>
<td>130 000</td>
</tr>
<tr>
<td>Total present value of project</td>
<td>- 34 000</td>
</tr>
</tbody>
</table>

Looking at the figures for the Midi and Maxi-alternative we can see that increasing the standard beyond the Mini-alternative would be profitable for the company, especially the Midi-alternatives. If the Maxi-alternative is compared with the Mini-alternative the Maxi-alternatives is clearly more profitable and three conclusions can be drawn from this:
- The company gives priority to social sustainability as it does not choose the most profitable alternative.
- A private profit maximizing company would renovate to higher standard.
- It is therefore questionable if the municipal housing company act in line with the new legislation that says that they shall act in a “businesslike way”. This will be returned to in the final section.
From a municipality perspective

The social cost of the municipality can increase when renovations leads to either more households becomes dependent on welfare payments or households that are already dependent on welfare get higher payments as their rents increased. According to the interviews with the company and the social authorities there were no observed increase in welfare dependency related to the renovation project, but it is likely that some households got higher welfare payments now that their rents increased. It was however not possible to get any data about this. As no household was forced to move out there were also no costs for the social authorities related to helping them find another apartment.

The general housing allowances in Sweden are paid by the central government and as these are related to the rent level it is likely that there were some increases in these payments related to the renovations. These allowances has been reduced during the last decade and primarily goes to the elderly and single-parents (see Enström-Öst 2010). It was not possible to get data on housing allowances for the renovation areas but a more general study on the effects of renovations on welfare payments and housing allowances have been started up.

4.5 Technical sustainability

In the first stage of the renovation programme there was an attempt to try a more innovative “industrial” approach when renovating the bathrooms by replacing the old bathrooms with a ready-made new one. This however turned out to create serious mold problems. The ambition to reduce costs came into conflict with technical sustainability.

The choice of technical alternatives was in general determined by the idea that the buildings should be able to function another fifty years. Experience from other companies indicates that many of the technical systems start to have problems after 50 years and that this is a reasonable time-frame for technical renovations. This also reflected the customer focus of the company according to which long term and reliable solutions should be chosen. As mentioned above the company has a clear strategy to be proactive and focus on pre-cautionary maintenance strategies – instead of letting the technical systems deteriorate in the way that was done earlier. In order to accomplish this the company has introduced a new property information system combined with regular inspections of the technical systems in order to e.g find leakages in an early stage.

An example of the company’s strategy to be pro-active is that there currently are plans to renovate the culverts for heating and water within the area. This is important from a service perspective as the consequences might be very serious for the tenants if these culverts break down in the middle of the winter. Renovation of the culvert system would also reduce energy losses to 1/10 of the current level even if this alone is not enough to make the renovation profitable. On the other hand the cost for damages that can occur if the technical systems break down is hard to calculate and this is also an important area for future research related to the optimal timing of renovation measures.

One further reason for carrying out planned maintenance is of course that procurement will be possible to do in a much more planned way and that this should lead to lower prices and/or higher quality.
5. Concluding analysis

It should be underlined that the case presented here should be seen as an explorative study with the aim of identifying possibilities and problems. The result points to a number of crucial issues.

- **The concept of sustainability:** There seems to be a need for a fourth interpretation of sustainability in the context of housing renovation and that is called “technical sustainability”. This means that more reliable, less risky and more long term solutions are chosen, even if this cannot be motivated from an environmental or economic perspective.

- **Priority between different sustainability dimensions.** There were a number of conflicts that the company had to take a stand on. Within social sustainability there is a conflict between a focus on the current tenants and their situation and trying to create more mixed communities. The company under study gives a clear priority to the current tenants. Economic sustainability was seen as a long term precondition for the other dimensions and the company therefore did not go as far as some other companies have done in trying to reduce energy consumption.

- **The possibility of sustainable renovation.** The case presented here shows that it is possible to reach rather high levels of sustainability in all dimensions. Even if social and economic sustainability in our interpretation was in focus, a number of environmentally motivated measures were carried out and the company also tried to act more proactive in their maintenance activities with technical sustainability in focus.

There were however also a number of more problematic aspects.

- **The role of the new legislation.** It seems that the company did not choose the most profitable alternative from company perspective. It is probable that a long term private owner would have renovated to a higher standard. The company interpreted “acting in a business like way” as “not needing any direct subsidies from the owner” and “acting professionally with a customer focus”, but this is perhaps not the correct interpretation.

- **Optimal timing.** The profitability of the renovation depends in this case on rather high operating and maintenance costs before the renovation, primarily because of water damages. If the company had acted more proactively and started the renovation earlier, it would probably not have been profitable.

- **Financial aspects:** Even if the renovation was profitable it was judged to be necessary to sell part of their Million Homes Programme stock in order to finance the renovation. An important aspect when looking at the renovation of this stock as a whole is then what happens to the stock that is sold. So far the renovation in that area has not started and it is uncertain what they will do, but the economic analysis above indicate that they probably will wait for a few more years and then renovate to a higher standard where some of the households cannot afford to move back. If this predication is correct then some areas would have to be “sacrificed” from a social sustainability perspective in order to “save” others.
- Relation between renovation and new construction of affordable housing. Looking at the housing market from a longer term “flow” perspective, optimal renovation strategies are related to the supply of affordable housing. If older areas are renovated to a high standard this might not be problematic from a social perspective if their either is a “filtering” down in other not so old areas or new construction of affordable housing. As none of this happens currently in Sweden, then it becomes especially important with the kind of renovation policy that the company in this case study tries to carry out where the current tenants is in focus without compromising with the goal of economic sustainability.

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Westin S (2011), "... men vart ska ni då ta vägen?" Ombyggnation ur hyresgästernas perspektiv. (…but where then will you reside? The Tenant’s Perspective of Renovation), Report nr 57, Institute for Housing and Urban Research, Uppsala University, Uppsala.